

IN THE CLAIMS

The text of all pending claims is set forth below. Cancelled and withdrawn claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strike through~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented) or (not entered).

Please CANCEL claim 10 and AMEND the claims in accordance with the following:

1. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of ~~elastically deformable members~~ hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and
multiple movable contacts facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the stationary contacts have branch portions that are contactable to the multiple movable contacts.

2-4. (CANCELLED)

5. (PREVIOUSLY PRESENTED) The micro relay according to claim 1:
wherein the stationary contacts that are contactable to the multiple movable contacts are provided independently.

6. (PREVIOUSLY PRESENTED) The micro-relay as claimed in claim 68, wherein the first substrate has through holes via which interconnection lines extending from the first substrate are extracted to an outside of the micro-relay.

7. (PREVIOUSLY PRESENTED) The micro-relay as claimed in claim 68, wherein the first substrate has through holes via which interconnection lines extending from the movable plate are extracted to an outside of the micro-relay.

8. (PREVIOUSLY PRESENTED) The micro-relay as claimed in claim 68, wherein interconnection lines extending from the first substrate to an outside of the micro-relay are flush with a surface of the first substrate.

9. (CANCELLED)

10. (CANCELLED)

11. (CURRENTLY AMENDED) The micro-relay as claimed in ~~claim 10~~claim 68, wherein the hinge springs are arranged symmetrically.

12-14. (CANCELLED)

15. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of hinge springs~~elastically deformable members~~ suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein at least one of the frame and the movable portion has a stopper that restricts in-plane movement of the movable portion.

16-17. (CANCELLED)

18. (CURRENTLY AMENDED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the movable portion has protrusions that prevent the movable portion from sticking to the first substrate.

19-21. (CANCELLED)

22. (PREVIOUSLY PRESENTED) The micro-relay as claimed in claim 68, wherein the second substrate has a flat plate shape.

23. (CANCELLED)

24. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the second substrate has a stationary contact facing the movable contact.

25-26 CANCELLED)

27. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the second substrate has stationary electrodes that face the movable contact.

28-29. (CANCELLED)

30. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the second substrate has a stationary electrode that faces the movable electrode, and a stationary contact that faces the movable contact.

31. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,

the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of ~~elastically deformable members~~ hinge springs suspending the movable portion from the frame,

the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode, wherein:

the second substrate has a stationary electrode that faces the movable electrode, and a stationary contact that faces the movable contact; and

the movable contact is separated from the stationary contacts of the first and second substrates in the absence of electrostatic attraction.

32. (CURRENTLY AMENDED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;

a second substrate arranged so as to face the first substrate; and

a movable plate arranged between the first and second substrates,

the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of ~~elastically deformable members~~ hinge springs suspending the movable portion from the frame,

the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode, wherein:

the second substrate has a stationary electrode that faces the movable electrode, and a stationary contact that faces the movable contact;

the movable contact is separated from the stationary contacts of the first and second substrates in the absence of electrostatic attraction; and

the movable contact is brought into contact with the stationary electrode of the second substrate or the stationary contacts of the first substrate due to electrostatic attraction.

33. (CURRENTLY AMENDED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein:
the second substrate has a stationary electrode that faces the movable electrode, and stationary contacts that face the movable contact; and
the movable contact is separated from the stationary contacts of the first and second substrates in the absence of electrostatic attraction.

34. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate and having stationary contacts; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the stationary contacts of the first substrate are for use in signal transmission, and the stationary contacts of the second substrate are for use in signal transmission.

35. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and

a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the second substrate has a stationary electrode, and an interconnection line extending from the stationary electrode of the second substrate is extracted to an outside of the micro-relay via a through hole formed in the second substrate.

36. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,
the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,
the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,
wherein the second substrate has a stationary contact facing the movable contact, and
wherein an interconnection line extending from the stationary contact is extracted to an outside of the second substrate via a through hole formed in the second substrate.

37. (CURRENTLY AMENDED) A micro-relay comprising:
a first substrate having stationary contacts and a stationary electrode;
a second substrate arranged so as to face the first substrate; and
a movable plate arranged between the first and second substrates,
the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of elastically deformable members hinge springs suspending the movable portion from the frame,

the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,

wherein the second substrate has a stationary contact facing the movable contact, and the movable plate has protrusions that prevent the movable portion from sticking to the second substrate.

38. (CURRENTLY AMENDED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;

a second substrate arranged so as to face the first substrate; and

a movable plate arranged between the first and second substrates,

the movable plate comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, a movable portion and a plurality of ~~elastically deformable members~~ hinge springs suspending the movable portion from the frame,

the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode,

wherein the second substrate has a stationary contact facing the movable contact, and the movable plate has protrusions that prevent the movable portion from sticking to the first and second substrates.

39. (CANCELLED)

40. (PREVIOUSLY PRESENTED) The micro-relay as claimed in claim 68, wherein the frame has a thickness that defines spaces between the movable plate and the first stationary contact and between the movable plate and the second stationary contact.

41-42. (CANCELLED)

43. (PREVIOUSLY PRESENTED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;

a second substrate arranged so as to face the first substrate;

a movable plate arranged between the first and second substrates,
the movable plate having a frame and a movable portion,

the frame being sandwiched between the first and second substrates to realize a
hermetical sealed structure,

the movable portion having a movable electrode facing the stationary electrode,
and a movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to
electrostatic attraction that develops between the movable electrode and the stationary
electrode;

a base substrate that supports the first substrate;

members that connect the movable electrode and the stationary electrode to pads
formed on the base substrate; and

resin that covers the first and second substrates and the movable plate.

44. (PREVIOUSLY PRESENTED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;

a second substrate arranged so as to face the first substrate; and

a movable plate arranged between the first and second substrates,

the movable plate having a frame and a movable portion,

the frame being sandwiched between the first and second substrates to realize a
hermetical sealed structure,

the movable portion having a movable electrode facing the stationary electrode, and a
movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to electrostatic
attraction that develops between the movable electrode and the stationary electrode,

wherein the frame has a protrusion and the movable portion has a counterpart recess.

45. (CANCELLED)

46. (PREVIOUSLY PRESENTED) A micro-relay comprising:

a first substrate having stationary contacts and a stationary electrode;

a second substrate arranged so as to face the first substrate; and

a movable plate arranged between the first and second substrates,

the movable plate having a frame and a movable portion,

the frame being sandwiched between the first and second substrates to realize a hermetical sealed structure,

the movable portion having a movable electrode facing the stationary electrode, and a movable contact facing the stationary contacts,

the movable portion moving between the first and second substrates due to electrostatic attraction that develops between the movable electrode and the stationary electrode, wherein the movable portion and the frame have an identical thickness.

47-67. (CANCELLED)

68. (CURRENTLY AMENDED) A micro-relay comprising:

a first substrate having a contact as a stationary contact and an electrode as a stationary electrode;

a second substrate facing the first substrate; and

a movable plate arranged between the first and second substrates,

the movable plate including:

a frame sandwiched between the first and second substrates forming a hermetical sealed structure,

a portion having an electrode as a movable electrode facing the stationary electrode, and a contact as a movable contact facing the stationary contact, and

a plurality of ~~elastically deformable members~~ hinge springs suspending the portion from the frame.